of which met the visitors and conducted them by rail or motor-car to factories, laboratories and other places of interest. The shorter of these tours took ten days, during which the party visited Philadelphia, Pittsburg, Niagara, Detroit, Chicago, Cleveland and Boston. The longer tour included a journey to the western and southern States, with visits to Salt Lake City, San Francisco, Los Angeles, Grand Canyon, Arizona, New Orleans, Atlanta and Washington.

The small band of British chemists who had the good fortune to attend this congress and take part in the excursions are unanimous in their praises of the splendid organisation and cordial generous hospitality experienced at every stage of their visit. American chemists are to be congratulated not only on a congress of great scientific interest and importance, but also on the unqualified success which invariably attended their praiseworthy efforts to entertain and instruct their guests.

G. T. MORGAN.

PREHISTORIC MURAL DECORATIONS IN BACON'S HOLE, SOUTH WALES.

THE cave of Paviland (Gower, South Wales), first investigated by Buckland so long ago as 1823, has lately acquired a fresh interest in the light of recent discoveries made in France.

Most of the objects found by Buckland are exhibited in the Oxford University Museum, where they fill the greater part of a case devoted to the Aurignacian age. Among them are cylindrical rods (like lead pencils in size and shape) carved out of mammoth ivory, an ivory lissoir (*i.e.*, smoother), and some other rudely shaped pieces of ivory. Prof. Breuil, the greatest authority on Aurignacian remains, being on a visit to Oxford, made an examination of these objects last week and unhesitatingly referred them all to the Aurignacian age. There are also some fragments of a beautifully worked ivory ring, about the size and shape of an Indian bangle, or a little smaller; these also were assigned with equal confidence to the Aurignacian, precisely similar rings having been found in deposits of this age in France.

As a consequence of these results, Profs. Breuil and Sollas decided to visit the caves of Gower in the hope of finding some painting on the walls. A halt was made on the way at Swansea, in order to examine the rich collection of flint implements from Paviland which are preserved in its museum. These proved unusually interesting, and were for the most part identified by Prof. Breuil as Upper Aurignacian, a few being Proto-Solutrian. A systematic search was then made of the caves, beginning with Paviland, on the west, and working towards Bacon's Hole, on the east; as cave after cave failed to yield any signs of painting, hope began to wane, but, on entering Bacon's Hole, colour was seen on the right-hand wall. Closer examination revealed the presence of ten bright red bands, approximately horizontal or slightly divergent, fan-like, arranged one above the other in a vertical series, about a yard long, each band being perhaps a foot in length and one to two inches in breadth, but no exact measurements were made. The stalactite which has tapestried the wall is very clean and has completely sealed up the red pigment (iron-ochre), so that it cannot be removed by rubbing.

It is of interest to note that similar bands, similarly arranged, but only eight in number, have been observed at the end of the great gallery in the Font de Gaume of Dordogne.

It is to be hoped that a general search will now be made in our English caves for other examples of mural decoration; they may be easily passed over by the casual visitor, and to be seen must be looked for.

NOTES.

As already announced in these columns, a meeting is to be held at the Mansion House at 2.30 p.m. on October 23 to take steps to raise a fund for the establishment of a memorial to the late Lord Lister. Among those who will address the meeting are the Prime Minister, the president of the Royal Society (Sir Archibald Geikie, K.C.B.), the president of the Royal College of Surgeons (Sir Rickman J. Godlee), Lord Avebury, F.R.S., and the Hon. W. F. D. Smith.

THE Paris correspondent of *The Times* announces that the international conference on time reckoning was opened at the Observatory on October 15 by M. Guist'hau, Minister of Education; and M. Bigourdan, member of the Institute and of the Bureau des Longitudes, was elected president. The conference has been summoned mainly with the object of dealing with various practical uses of wireless telegraphy in the synchronisation of time signals throughout the world.

SIR GEORGE DARWIN, who recently underwent an operation, continues to make such good progress toward recovery that no further bulletins will be issued.

THE death is announced, at the age of fifty-eight, of Mr. F. H. Low, the honorary secretary of the Röntgen Society. Mr. Low was the medical officer to the X-ray department of the London Medical Graduates' College and Polyclinic.

IT is announced, through Reuter's Agency, that the Nobel prize for medicine for 1912 has been awarded to Dr. Alexis Carrel, of the Rockefeller Institute for Medical Research in New York, for his works on the suture of vessels and the transplantation of organs. The prize this year is said to amount to about 7800*l.*

A COURSE of six lectures on the properties and manufacture of concrete is to be given, by Mr. H. Kempton Dyson, secretary of the Concrete Institute, at the Concrete Institute, Denison House, Vauxhall Bridge Road, Westminster, at 5.30 p.m. on Tuesdays, beginning on November 12. The lectures are free, and tickets of admission may be obtained from the secretary of the institute.

A MEMORIAL service for the late Mr. H. O. Jones, F.R.S., fellow of Clare College, Cambridge, demonstrator to the Jacksonian professor of natural experimental philosophy, and Muriel Gwendolen Jones, his wife, who were killed in the Alps in August while on honeymoon, was held at the University Church of St. Mary the Great, Cambridge, on October 12. The service was attended by a large congregation, which included masters of several colleges, University professors, and many other members of the University. The Royal Society, the Alpine Club, and the Cambridge Alpine Club were also represented.

THE council of the Institution of Civil Engineers has made the following further awards for papers read during the session 1911–12:—A Watt gold medal to Prof. W. H. Burr (New York), and the Crampton prize to Prof. R. J. Durley (Montreal). The following Telford premiums have also been awarded for papers published in the Proceedings without discussion during the same session:—To Messrs. Paul Seurot (New York), David Anderson, and Harry Cunningham (London), Dr. S. P. Smith (Birmingham), Mr. E. G. Rivers (Richmond), Mr. E. H. Morris (Manchester), and Prof. A. H. Gibson (Dundee). The Howard quinquennial prize for 1912 has been awarded to Mr. J. H. Darby (Sheffield), in recognition of improvements introduced by him in iron and steel production, and the Indian premium for 1912 to Mr. H. H. G. Mitchell (Madras).

THE nineteenth report of the Museum and Art Gallery Committee to the Town Council of the borough of Leicester deals with the period from April 1, 1910, to March 31, 1912, and provides an interesting description of two years' excellent work and progress. In addition to the Saturday evening public lectures, which have long been a successful part of the committee's work, a commencement has been made in the matter of lectures to teachers. The movement among educational authorities in favour of a more enlightened use of museums calls for a knowledge on the part of teachers of the contents of these institutions. In Leicester the curator has arranged a series of lectures to local teachers, intended to show how the contents of the museum may be used to instruct and interest children in the subjects illustrated by the exhibits. The report also points out that a small vivarium has been commenced and has proved a great attraction to visitors. Various living examples of British reptiles, batrachians, and invertebrates are on show, as well as two or three exotic forms.

A RECENT number of *The Journal of Tropical Medicine and Hygiene* (vol. xv., No. 17) contains an account of the investigations on the etiology of pellagra carried on by Drs. Sambon and Chalmers, for which financial support was generously provided by Mr. Henry S. Wellcome. There are two opposed theories in the field with regard to the causation of this disease; according to the prevailing view, that of the "zëists," pellagra is the result of poisoning by unsound maize; Dr. Sambon, on the other hand, believes the disease to be due to infection by a parasitic organism, propagated by the agency of Simuliidæ, small biting flies which breed in running streams. As the result of epidemiological investigations carried on in many countries, Drs. Sambon and Chalmers have brought together a considerable body of facts and observations which tend to disprove, on one hand, any connection between pellagra and a maize diet, and to prove, on the other hand, that all areas in which the disease is endemic are situated in close proximity to streams in which Simuliidæ breed. It remains, however, for the parasitic theory of pellagra to receive definite proof by the discovery of the parasite (provisionally assumed to be "protozoal" in nature), and of its transmission and life-history.

The Museums Journal for September contains a notice, accompanied by a plan, of the proposed extensions of the Natural History and the Science Museums, based on "White Paper" Cd. 6221. It is pointed out that the housing of the Geological Survey and its collections in an extension of the eastern end of the Natural History Museum ought to prove advantageous on account of leading to greater facilities of cooperation between the palæontologists of the museum and the officers of the survey. On the other hand, the trustees of the British Museum are supported in their objection to the proposed removal and rebuilding of the spirit building at the Natural History Museum.

UNDER the heading of "The Insect's Homer," Mr. Maurice Maeterlinck directs attention in the September issue of *The Fortnightly Review* to a little-known work by J. H. Fabre, in ten volumes, entitled "Souvenirs entomologiques." Fabre, it appears, was a native of Provence, where his memory has recently been honoured by a special celebration. According to the author of the article, he was "one of the most profound and inventive scholars, and also one of the purest writers, and, I was going to add, one of the finest poets of the century that is just past." In these volumes, from which copious extracts are given, Fabre recorded the results of fifty years of observation, study, and experiment on a number of insects, including wasps and wild bees, certain gnats, flies, beetles, and caterpillars.

IN the Bulletin of the American Museum of Natural History (vol. xxxi., p. 313) Mr. Abbott H. Thayer replies—and we venture to think very ably—to recent criticisms of his views with regard to cryptic and protective coloration in animals. After replying to objections that have been made against the protective nature of the "white-belly" type of coloration, the author directs attention to the extreme importance of the level from which the cryptically coloured animal is viewed. "An animal [such as a zebra] seen from a level above his own, has the dark earth for a background, while, at the very same moment, seen from two or three feet lower down [the lion's point of view] he has the bright sky instead, or is, at least, seen in the direction in which sky or glimpses of sky are to be expected. The moment this is understood, it becomes obvious that there is no such thing as a cryptic coloration *per se*, and that any amount of conspicuousness from all other view-points has nothing whatever to do with the question." The author illustrates this pictorially by means of a photograph of a "dummy" zebra and ass placed among thin scrub, and viewed from a lower level, when the former animal becomes practically invisible against the sky-line, while the latter stands out sharply silhouetted against the same.

THE bright coloration of most Hemiptera is due to a fatty tissue known as pseudovitellus, and this tissue invades the developing egg at an early stage of maturation. Its significance has been variously interpreted, but only quite recently has its true function been discovered. Thanks to Sulc and Pierantoni, it is now known to be the habitat and to provide the food of multitudes of symbiotic organisms, probably yeasts. Every Aphis, every Psyllid, is a synthesis of two organisms, one the insect and the other the symbiont. Dr. Buchner, "Studien an intracellularen Symbionten" (part i., *Archiv f. Protistenkunde*, vol. xxvi., 1912), has taken up the detailed study of the range and nature of this form of symbiosis, and he gives a very interesting and well-illustrated account of his researches. Beginning with certain Coccidæ, in which the pseudovitellar cells may be present or absent (facultative mycetocytes), he proceeds to describe the definite organ (mycetom) which they form in Aphids and others. They may be infected by one kind of symbiont, by two kinds rigidly kept from commingling, or even (Psyllidæ) by three kinds. Similar symbiotic organisms are not limited to Hemiptera, and indications are given that they occur in cockroaches, beetles, Hymenoptera, and Lepidoptera. The organisms are carefully described, and the whole subject is one that deserves the fullest attention from botanists, and especially from mycologists. The relations between the insect and the symbionts are still in need of elucidation.

WE have received from Messrs. Gallenkamp and Co., Ltd., Sun Street, Finsbury Square, E.C., a copy of their new catalogue of apparatus for botanical laboratories (List No. 61). This catalogue, in which every requisite for the study of plant physiology is listed, with numerous illustrations of special apparatus for physiological experiments as well as of general laboratory materials, is indispensable to teachers of botany. The chief feature of the catalogue is the listing of the apparatus described in standard text-books on plant physiology; the portion dealing with botanical material and slides contains a rather large number of misprints in the names of plants.

MR. O. F. COOK has published an interesting note in the Journal of the Washington Academy of Sciences (vol ii., No. 9) on the morphology of the leaf in various members of the Prunus section of Rosaceæ, sometimes regarded as a separate family (Amygdalaceæ). The leaves of plum, peach, apricot, &c., have a joint at the base, just above the insertion of the stipules, as in many leguminous plants; the part below this joint does not fall off with the leaf-stalk, but remains alive and forms a supplementary bud-scale. This is regarded as a vegetative character which supports the view that the Amygdalaceæ are deserving of family rank, and also as strengthening the connection between the rosaceous and leguminous series. The fact that small leafy outgrowths sometimes replace the nectaries on the upper part of the leaf-stalk in various Amygdalaceæ suggests the view that the immediate ancestors of this family had compound leaves, these nectaries corresponding to the marginal glands of the leaf-blade and representing rudiments of divisions of compound leaves.

MR. F. W. CLARKE returns to the consideration of the average composition of various rocks in a paper on some geochemical statistics (Proc. Amer. Philosophical Soc., vol li., 1912, p. 214). His results give us an average igneous rock with a silica percentage of about 60, and the "surprising conclusion" (p. 227) that the volume of limestones in the crust is less than that of the salts dissolved in the ocean. The relation of these salts to the earth's age is again referred to.

DR. VAUGHAN CORNISH considers the origin of the Jamaica earthquake of January 14, 1907, in a short paper in *The Geographical Journal* for September. In his account of the earthquake published in the same journal for March, 1908, he shows that the destructive intensity of the earthquake was almost limited to a narrow zone crossing the island from near Kingston to Buff Bay on the north coast. The earthquake evidently originated in two foci, one near the mouth of the river Hope, a few miles east of Kingston, the other about ten miles to the north in the neighbourhood of the head-waters of the river at Hardware Gap. The earthquake could be assigned to no known fault, but, as shown by the small extent of the area of destruction, the depth of the foci must have been inconsiderable. Dr. Cornish therefore attributes the earthquake to the redistribution of stresses in the surface-crust through the action of river-denudation, the added load near the mouth of the Hope river causing a subsidence along a shallow-seated fracture, while the diminution of pressure among the mountains at Hardware Gap would, he thinks, result in elevation along another fracture.

THE report of the Sonnblick Society directs attention to the fact that in September, 1911, the Sonnblick Meteorological Observatory, at an altitude of 3105 metres, completed the twenty-fifth year of its useful work. It is the highest in Europe which has a resident staff all the year round, and was established by the Austrian Meteorological Society at the instigation of Hofrath Dr. J. Hann. At the end of 1892 it was in danger of being relinquished owing to the want of funds, when the Sonnblick Society was formed and came to its rescue by obtaining subscriptions, which are still continued. Later on the permanency of the establishment was assured by a Government grant in aid. The following data are extracted from the published results for 1911:—

	January	July	Year
Mean temperature (C.)	−13·4°	2·2°	−5·9°
Absolute maximum	−4·4	10·1	10·1
,, minimum	−28 5	−5·6	−28·5

The melted snow and rain for the year amounted to 1398 mm., on 229 days. Rain was only measured on a few days from June to September. Fog occurred on 230 days.

IN the Journal of the Meteorological Society of Japan (vol. xxxi., No. 7) Mr. G. Ishida describes some experiments carried out at Hamada with the view of improving the efficiency of storm warning signals at night. In the tests two kinds of oil lamps were used, provided respectively with circular and flat wicks.

Observers were stationed at various distances up to 5·4 kilometres from the signals, and naked-eye records were taken. There were three sets of experiments, to determine (1) the relative advantages of circular and flat-wick lamps; (2) the range of red and green lights; and (3) the distance at which two separate lights can be distinguished. The results showed (1) that the light from the flat wicks was considerably brighter at a distance than that from the round wicks, particularly when the line of vision formed a right angle with the sides of the wick, and (2) that the range of the red lights (flat wicks) was approximately double that of the green, the latter being scarcely visible at 3 kilometres, while the former were still bright at 5 kilometres. In the third set of experiments observations were taken at distances of 2 and 3 kilometres of pairs of lights separated by intervals of 2, 3, 4, and 5 metres. At 3 kilometres none of the pairs were distinguishable as separate lights when the space between them was less than 4 metres. With a separation of 2 metres red or green pairs were merged into one bright light. When red and green lights were shown simultaneously, the green light was eclipsed altogether by the red at 2 kilometres if the distance separating them was not more than 2 metres.

Part 15 of the *Verhandlungen* of the German Physical Society contains a description of a mechanical pump for high vacua recently devised by Dr. W. Gaede, which makes use of a principle not previously utilised in the construction of such apparatus. If a shaft revolving in a well-fitting bearing has a circular slot cut in it, the air in the slot will to a large extent be carried round with the shaft. If at one part the bearing projects into the slot so as to fill it completely, the gas in the slot will be carried round with the shaft from one side of the projection to the other, and the pressure will in consequence be less on one side than on the other. If two openings are made through the bearing, one on each side of the projection, air will be drawn in through one and delivered through the other. By making a number of slots in the shaft and connecting the openings into them in series, the action will be intensified. A pump constructed on these lines exhausts five or ten times as fast as one of Dr. Gaede's well-known mercury pumps taking the same power, and deals with the water vapour as well as the gas, so that no drying materials are necessary. As it works better at low than at high pressures it is run in conjunction with another pump, which reduces the pressure to a few centimetres of mercury.

In a publication of the *R. Accad. delle Sci. dell' Inst. di Bologna,* which has recently come to hand, Prof. A. Righi describes some interesting experiments on the emission of ions in directions perpendicular to that in which the main discharge passes. Two wire electrodes are sealed into a cylindrical vacuum tube, perpendicular to the axis, with only their points exposed. When an impulsive discharge is passed between them it is found that ions are shot along the axis of the tube. The distance they penetrate and their relative numbers under different conditions are studied by collecting them in a suitably placed Faraday cylinder. By an ingenious arrangement of vanes, which rotate when the ions strike them, it is possible to follow the paths of the particles. This transverse emission of ions is most vigorous near the ends of the main discharge. When the tube is placed in a magnetic field parallel with its axis the neutral doublets, already investigated by Prof. Righi in earlier papers, are formed, and, as would be expected, the Faraday cylinder collects less charge. On the other hand, owing to the large mass of the doublets, the mechanical effects are increased.

An article in *Engineering* for October 11 recalls the discussion of a few years ago on the distribution of shearing stresses on the horizontal layers of a dam. Messrs. Wilson and Gore showed experimentally in 1908 that the stresses did not follow a parabolic distribution, but were much more uniform. Prof. E. G. Coker has lately described experiments at the Royal Society on thin celluloid sheets under shearing stress, the conditions resembling that of the web plate of a plate girder. It has been contended that the shearing stresses in the girder web follow the parabolic law, but these experiments indicate that this law is only approached when the plate is shallow. Otherwise the shear curve had no maximum at the centre of the specimen, but showed two equal maxima, which are at points situated at a distance from the ends equal to rather less than the width of plate under test. Reducing the depth of the plate causes these two maxima to approach each other, and they finally coalesce when the depth of the specimen is about equal to its width.

A second edition of Mr. T. H. Byrom's "Physics and Chemistry of Mining: an Elementary Class-book for the Use of Mining Students," has been published by Messrs. Crosby Lockwood and Son. In this edition the chapter on magnetism and electricity has been omitted, and additional matter has been introduced in both the physical and chemical sections. The price of the volume is 3*s.* 6*d.* net.

Messrs. H. F. Angus and Co., of Wigmore Street, London, have issued a new catalogue of second-hand scientific apparatus and accessories which are available for sale, exchange, or hire. We notice that all the instruments listed, unless otherwise stated, have been tested, adjusted where necessary, and are capable of work of equal precision as when new. Interesting particulars are given in the list of microscopes and accessories, as well as of various other optical instruments.

OUR ASTRONOMICAL COLUMN.

Gale's Comet, 1912*a*.—London urban skies have remained comet-proof for some time now, but Mr. Franks, writing to *The Times* (October 15), reports that he saw Gale's comet very well, with a 6-inch refractor, during the week ending October 11, at East Grinstead. He states that it appeared to be brightening, for it was about fifth magnitude when he first saw it, and was nearer fourth on October 11. On this date it was a fine object, plainly seen in the finder, and, by sighting along the telescope, it could be seen by the naked eye as a misty spot about half a